

REMARKS

Reconsideration and allowance of the application are respectfully requested in light of the above amendments and the following remarks.

Claims 23-24, 26-32, 34-39, and 41- 45 have been amended to clarify various patentable aspects of the claimed methods and apparatuses, to ensure proper antecedent support for each recited feature, and to correct minor grammatical issues, and claims 33 and 40 have been cancelled without prejudice or disclaimer. Support for the amendments to the claims is found, for example, in paragraphs [0049]-[0066] and FIG. 5 of the published U.S. application, and the cancelled claims. (It should be noted that references herein to the specification and drawings are for illustrative purposes only and are not intended to limit the scope of the invention to the referenced embodiments.) No new matter is added.

Objections To The Drawings

Replacement sheets labeling FIGs. 1-4, 6 and 8 as “Related Art” are submitted herewith as separate sheets. Accordingly, it is respectfully submitted that the objections to the drawings should be withdrawn.

35 U.S.C. §101 Rejections

Claims 37-45 were rejected under 35 U.S.C. §101 because “the claimed invention is directed to non-statutory subject matter” (Office Action, pg. 2). Claim 37 has been amended to recite a “... scheduling apparatus for use in a mobile communication system...” Therefore, it is respectfully submitted that claim 37 includes a hardware component and is therefore clearly directed towards statutory subject matter. Accordingly, it is respectfully submitted that the rejections of claims 37-45 under 35 U.S.C. §101 should be withdrawn.

35 U.S.C. §112, Second Paragraph Rejections

Claims 23-45 were rejected under 35 U.S.C. §112, second paragraph, for lacking proper antecedent basis and/or not being “clearly understood” (Office Action, pg. 3). As noted above, claims 23-24, 26-32, 34-39, and 41-45 have been amended to clarify various patentable aspects of the claimed invention, to ensure proper antecedent support for each recited feature, and to correct minor grammatical errors. Thus, the 35 U.S.C. §112, second paragraph rejections should be withdrawn.

Additionally, it is noted that the Office Action alleges, at pg. 3, item 8(a)(ii), that the feature recited by claim 31 of “...the step of checking whether at least one other resource constraint...” lacks antecedent basis. However, this allegation is plainly incorrect, because the term “at least one other resource constraint” clearly does not recite either “the” or “said,” and thus, does not have any antecedent problems. Accordingly, the rejection of claim 31 under 35 U.S.C. §112, second paragraph should be withdrawn for at least this reason.

Moreover, the Office Action alleges, at pg. 3, item 8(b)(i), that “it is not clearly defined what constitutes allocation units.” However, it is well known that a “fundamental principle contained in 35 U.S.C. §112, second paragraph is that applicants are their own lexicographers. They can define in the claims what they regard as their invention essentially in whatever terms they choose so long as any special meaning assigned to a term is clearly set forth in the specification.” MPEP 2173.01. Here, the Applicants have chosen to use the term “allocation units” to define a particular feature of the claimed methods and apparatuses. It is further noted that claim 30, which depends from claim 23, further defines one type of the claimed allocations units as: “...wherein the allocation units have a quantity of one of transmittable information bits, Internet Protocol packets, code blocks or modulation symbols.” Moreover, it is also noted that

an exemplary, non-limiting description of allocation units is provided in paragraph [0062] of the published U.S. application. Thus, despite the allegations set forth in the Office Action, the term “allocation units” is clearly defined and easily understood by one of ordinary skill in the art.

Furthermore, the Office Action alleges, at pg. 3, item 8(b)(i), that in lines 9-11 of claim 23, “it is unclear of when to perform the step of ‘releasing the allocation units scheduled for a user’ (e.g. when the scheduled allocation units meet a resource constraint? or when it doesn’t meet?” However, this allegation is also plainly incorrect, because (1) the claim does clearly recite when the step of releasing the allocation units is to be performed, and (2) the Applicant is not required to limit the claim in the manner suggested by the Office Action. It is well-known that “[i]n reviewing a claim for compliance with 35 U.S.C. 112, second paragraph, the examiner must consider the claim as a whole to determine whether the claim apprises one of ordinary skill in the art of its scope and, therefore, serves the notice function required by 35 U.S.C. §112, second paragraph, by providing clear warning to others as to what constitutes infringement.” MPEP 2173.02. In this case, claim 23 has been amended to recite the feature of: “...releasing the allocation units that are scheduled for the user or service for said current scheduling frame in response to a result of checking whether the allocation units that are scheduled for the user or service in said current scheduling frame meet the at least one resource constraint.” One of ordinary skill in the art would very easily understand the scope of this claimed feature, including understanding that the allocation units are released “in response to a result of checking whether the allocation units that are scheduled for the user or service in said current scheduling frame meet the at least one resource constraint.”

Accordingly, it is respectfully submitted that the rejections of claims 23-45 under 35 U.S.C. §112, second paragraph should be withdrawn.

35 U.S.C. §§102 and 103 Rejections

Claims 23-30, 33, 36-37 and 40-44 were rejected under 35 U.S.C. §102(e) as being anticipated by Klein (US Pub. No. 20040053574 A1) (hereinafter, “Klein”). Claims 31, 32, 38 and 45 were rejected under 35 U.S.C. §103(a) as being unpatentable over Klein as applied to claim 23. Claims 34, 35 and 39 were rejected under 35 U.S.C. §103(a) as being unpatentable over Klein as applied to claim 1, in view of Havinga et al. “Energy-efficient TDMA Medium Access Control protocol scheduling.” (hereinafter, “Havinga”).

To the extent that these rejections may be deemed applicable to the amended claims, the Applicants respectfully traverse based on the points set forth below.

Claim 23 has been amended and now recites the features of:

“23. A method for performing a scheduling algorithm with minimum resource scheduling in a mobile communication system, comprising:

scheduling allocation units for a user or service on a per-scheduling frame basis, wherein each scheduling frame comprises a plurality of allocation units,

checking whether the allocation units that are scheduled for the user or service in a current scheduling frame meet at least one resource constraint,

releasing the allocation units that are scheduled for the user or service for said current scheduling frame in response to a result of checking whether the allocation units that are scheduled for the user or service in said current scheduling frame meet the at least one resource constraint, and

re-scheduling the released allocation units in the current scheduling frame to at least one other user or service” (emphasis added).

As explained in the specification, the method recited by claim 23 performs a scheduling algorithm with minimum resource scheduling to save power resources (see paragraphs [0020]-[0022] of the published U.S. application).

Klein relates to a method and apparatus for resource management in integrated data and voice communications, and more specifically, for allocating resources in order to accommodate voice and data users while maximizing resource usage (see paragraph [0001]). The system permits access to data users in a way that maximizes average data throughput and efficiency of power consumption by the data users while minimizing the negative impact of data communication on voice users which compete for allocation of resources (see paragraph [0003]). As shown in Fig. 1, base station 102 has a power control module 108 and a transmission candidate selection module 114 which serves, via a TDMA channel 106, a plurality of voice handsets 104D-104N which are always allowed to communicate, and a plurality of data communication handsets, 104A-104C, among which only one is allowed to communicate during a particular one of the time intervals 120A-120N (see paragraphs [0020]-[0021]).

In order to select which one of the data communication handsets 104A-104C is allowed to transmit, the transmission candidate selection module conducts steps 216-222 in Fig. 2, which includes selecting the user with the best channel gain as a candidate and comparing whether the gain meets a long term established threshold. If the gain does not meet the threshold, the candidate is inhibited from transmission (Step 220) and the transmission rate is set to zero for that handset (see paragraphs [0025] and [0030]).

It is important to note that in the procedure shown in Fig. 2 of Klein, a handset is only allowed to transmit (i.e. is only allocated resources for transmission) in case the gain meets the threshold in step 218. Thus, a handset is only scheduled if the gain meets the threshold in step 218. In other words, "...scheduling allocation units for a user or service..." (see claim 23) is only performed for those handsets in Klein for which the gain meets the threshold in step 218.

From this above-noted teaching of Klein, it is apparent that the technique disclosed by Klein has no reason to check the already scheduled resources (i.e. after the scheduling step) for some criterion, as the criterion for deciding whether or not to allocate resources to a given handset is checked beforehand, not after scheduling (as recited by claim 23). Hence, Klein fails to teach or suggest the feature of:

“...checking whether the allocation units that are scheduled for the user or service in a current scheduling frame meet at least one resource constraint...”

as recited by claim 23.

Accordingly, it is respectfully submitted that allowance of claim 23 and all claims dependent therefrom is warranted for at least this reason.

Furthermore, following the same line of arguments, it is also apparent that Klein fails to teach the features of: “releasing the allocation units that are scheduled for the user or service for said current scheduling frame in response to a result of checking whether the allocation units that are scheduled for the user or service in said current scheduling frame meet the at least one resource constraint” and “re-scheduling the released allocation units in the current scheduling frame to at least one other user or service,” as recited by claim 23.

As explained above, Klein discloses that either the handset is permitted to transmit data or not, as determined in step 218 of Fig. 2. In Klein, after being permitted to transmit data (see step 218 and steps 222, 224, 226 and 228 of Fig. 2 and the corresponding description in paragraphs [0030] and [0031] of Klein), there are no additional steps of releasing and re-scheduling allocation units that are scheduled beforehand. Therefore, Klein fails to disclose, either expressly or inherently, the features of “releasing the allocation units that are scheduled...” or “re-scheduling the released allocation units...”, as recited by claim 23.

Moreover, it is noted that the Office Action (pg. 6, item 20) alleges that the “re-scheduling” feature recited by cancelled claim 33 (and now incorporated into claim 23) is disclosed at “par. 30” and “fig. 2” of Klein. However, paragraph [0030] of Klein merely discloses the following:

“At step 214, the instantaneous channel gains of all data handsets are compared. At step 216, the data handset with the best channel gain is selected as a candidate for transmission. At step 218, the instantaneous channel gain of the selected data handset is compared to the gain threshold. If the gain for the selected data handset is below the gain threshold, the process proceeds to step 220 and the selected data handset is inhibited from transmission, suitably by setting a transmission rate of zero for the handset. The process then returns to step 214. If the gain experienced by the selected data handset is at or above the gain threshold, the process proceeds to step 222, a transmission rate is set for the selected data handset. The transmission rate is preferably constant, allowing the selected data user to transmit at a constant rate during the entire time slot. As step 224, the selected data user is allowed to transmit at a power that will yield the desired rate, the power being determined based on the gain experienced by the user and a parameter determined based on the number of users and their respective power constraints. The power level is preferably inversely proportional to the gain experienced by the handset.” (emphasis added)

As noted above, this paragraph does not even mention anything related to “re-scheduling” at all, and thus clearly does not teach or suggest the feature “re-scheduling the released allocation units in the current scheduling frame to at least one other user or service,” as recited by claim 23. Although the iterative procedure shown in Fig. 2 and described in paragraph [0030], above, implies that one candidate handset after another is considered in the procedure (“At step 214, the instantaneous channel gains of all data handsets are compared... If the gain for the selected data handset is below the gain threshold, the process proceeds to step 220 and the selected data handset is inhibited from transmission... The process then returns to step 214”), Klein does not imply or suggest that some resources that have already been scheduled to a

permitted handset will be re-scheduled to another user or service thereafter. Klein simply does not teach or suggest this recited feature of claim 23.

Accordingly, it is respectfully submitted that allowance of claim 23 and all claims dependent therefrom is warranted for at least this reason as well.

Claim 37 has been amended to recite substantially the same features, including the “re-scheduling” feature, which distinguish method claim 23 from Klein, although claim 37 does so with respect to a scheduling apparatus. Accordingly, it is respectfully submitted that allowance of claims 23 and 37 and all claims dependent therefrom is warranted for at least these reasons.

In view of the above, it is submitted that this application is in condition for allowance and a notice to that effect is respectfully solicited.

If any issues remain which may best be resolved through a telephone communication, the Examiner is requested to telephone the undersigned at the local Washington, D.C. telephone number listed below.

Respectfully submitted,

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